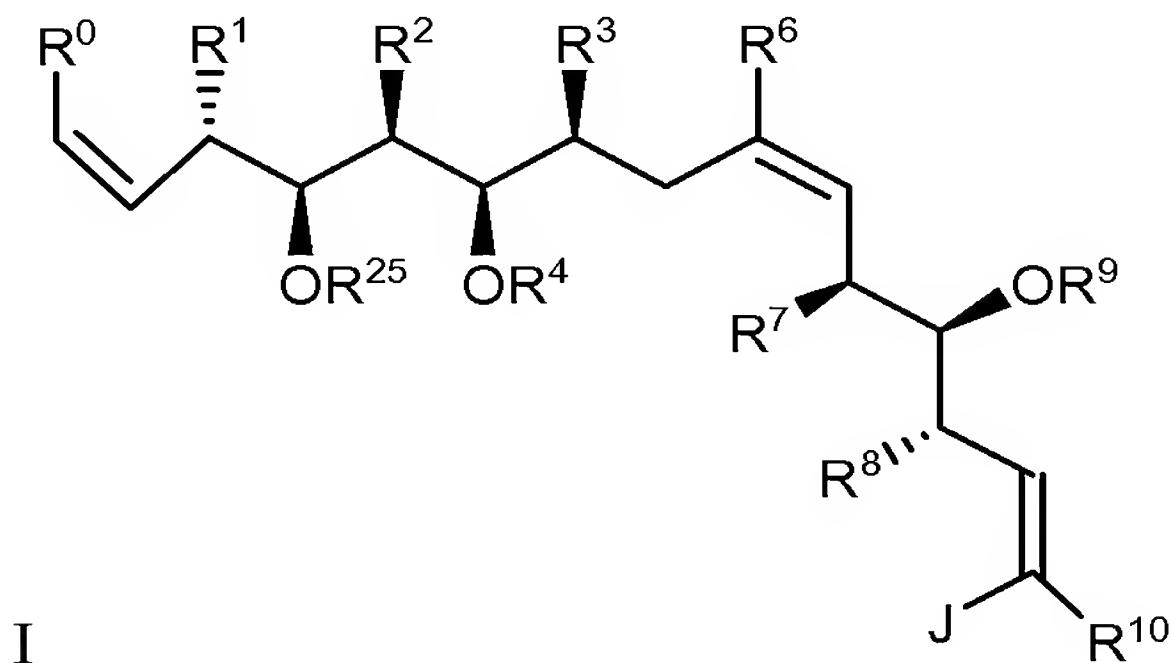


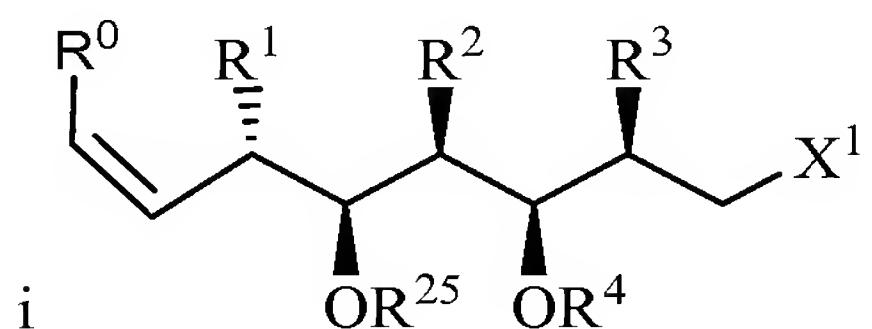
This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

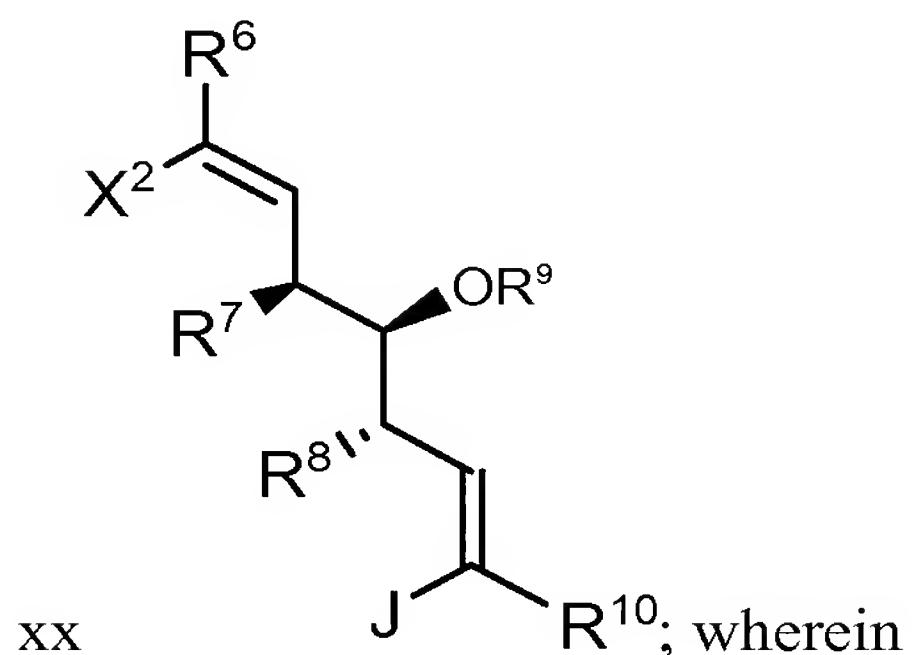
1. (original) A process for synthesizing a compound of formula I



comprising contacting a compound of formula i



with a compound of formula xx



R<sup>0</sup> is C<sub>1-6</sub> alkyl, C<sub>2-6</sub> alkenyl, C<sub>2-6</sub> alkynyl, (CH<sub>2</sub>)<sub>r</sub>(C<sub>3-6</sub> cycloalkyl), (CH<sub>2</sub>)<sub>r</sub>(aryl)

or (CH<sub>2</sub>)<sub>r</sub>(heterocycle), wherein r is 0, 1, 2, 3, or 4;

R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are, independently, H or C<sub>1-C10</sub> alkyl;

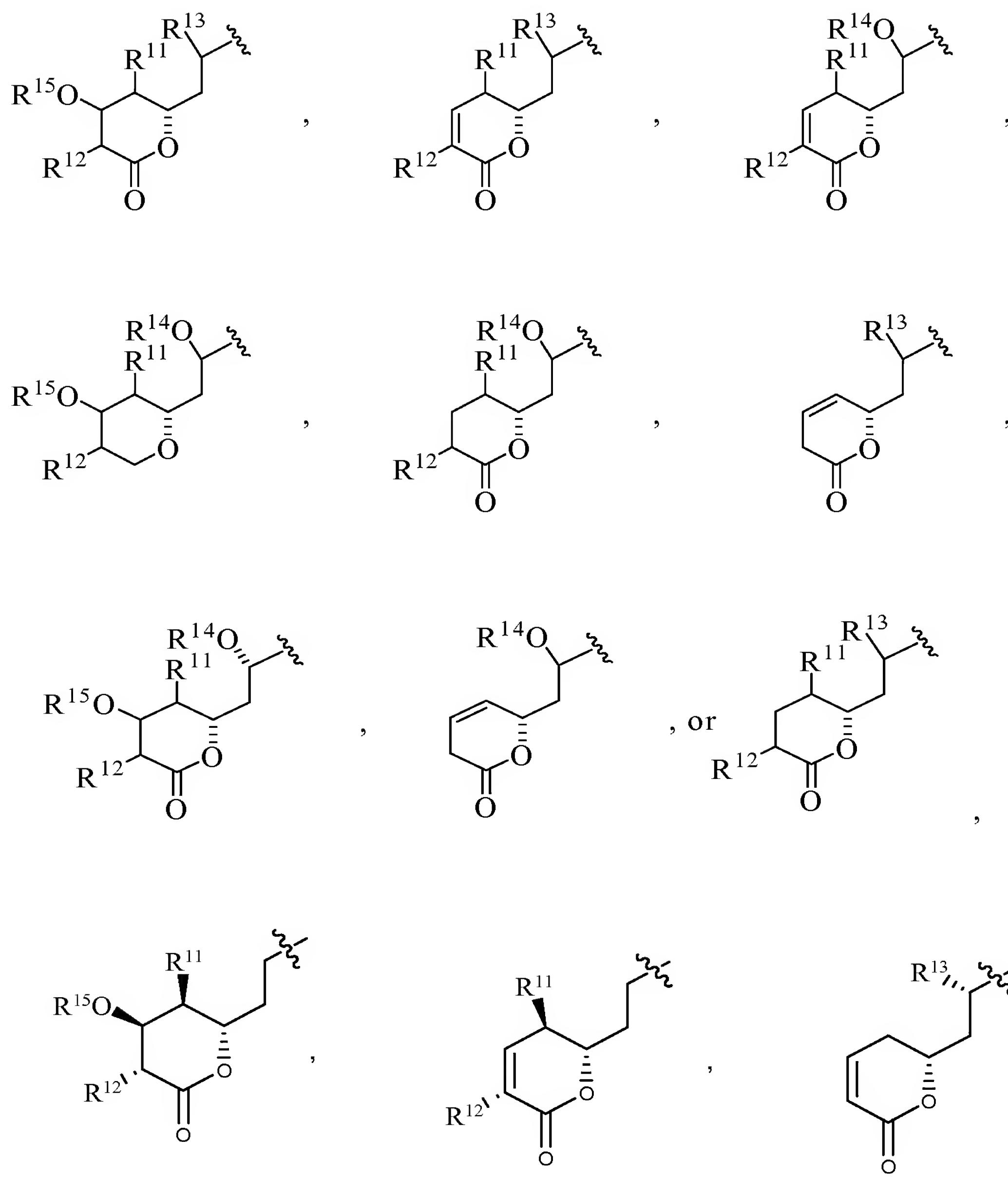
R<sup>4</sup> and R<sup>9</sup> are, independently, H or an acid labile hydroxyl protecting group;

$R^{10}$  is hydrogen or  $C_1-C_6$  alkyl;

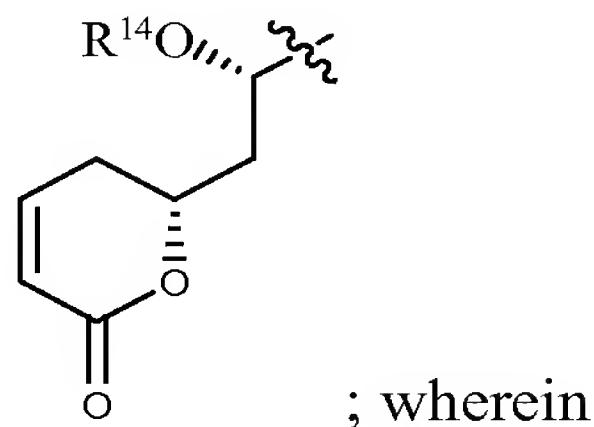
$R^{25}$  is hydrogen or an oxidation labile hydroxyl protecting group;

$X^1$  and  $X^2$  is, independently, a halogen, triflate, tosylate, or mesylate; and

$J$  is



or



; wherein

$R^{11}$ ,  $R^{12}$  and  $R^{13}$  are each independently H or  $C_1-C_{10}$  alkyl; and  
 $R^{14}$  and  $R^{15}$  are, independently, H or an acid labile hydroxyl protecting group.

2. (original) The process of claim 1, further comprising subjecting the process to a catalytically effective amount of a cross-coupling metal catalyst.

3. (original) The process of claim 2, wherein the cross-coupling metal catalyst comprises nickel or palladium.

4. (original) The process of claim 2, wherein the cross-coupling metal catalyst is  $Pd(0)$ .

5. (original) The process of claim 2, further comprising contacting the compound of formula i with a metallating agent, wherein the metallating agent is a compound containing boron, zinc, tin, magnesium, or aluminum, or a combination thereof.

6. (original) The process of claim 5, wherein the metallating agent is a compound containing boron.

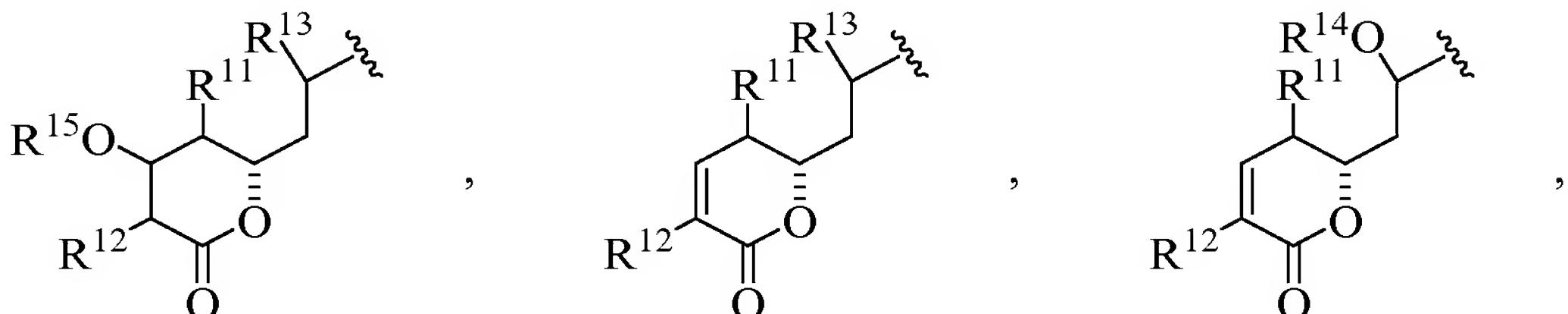
7. (original) The process of claim 5, wherein the metallating agent is  $MeO\text{-}9\text{-}BBN$ .

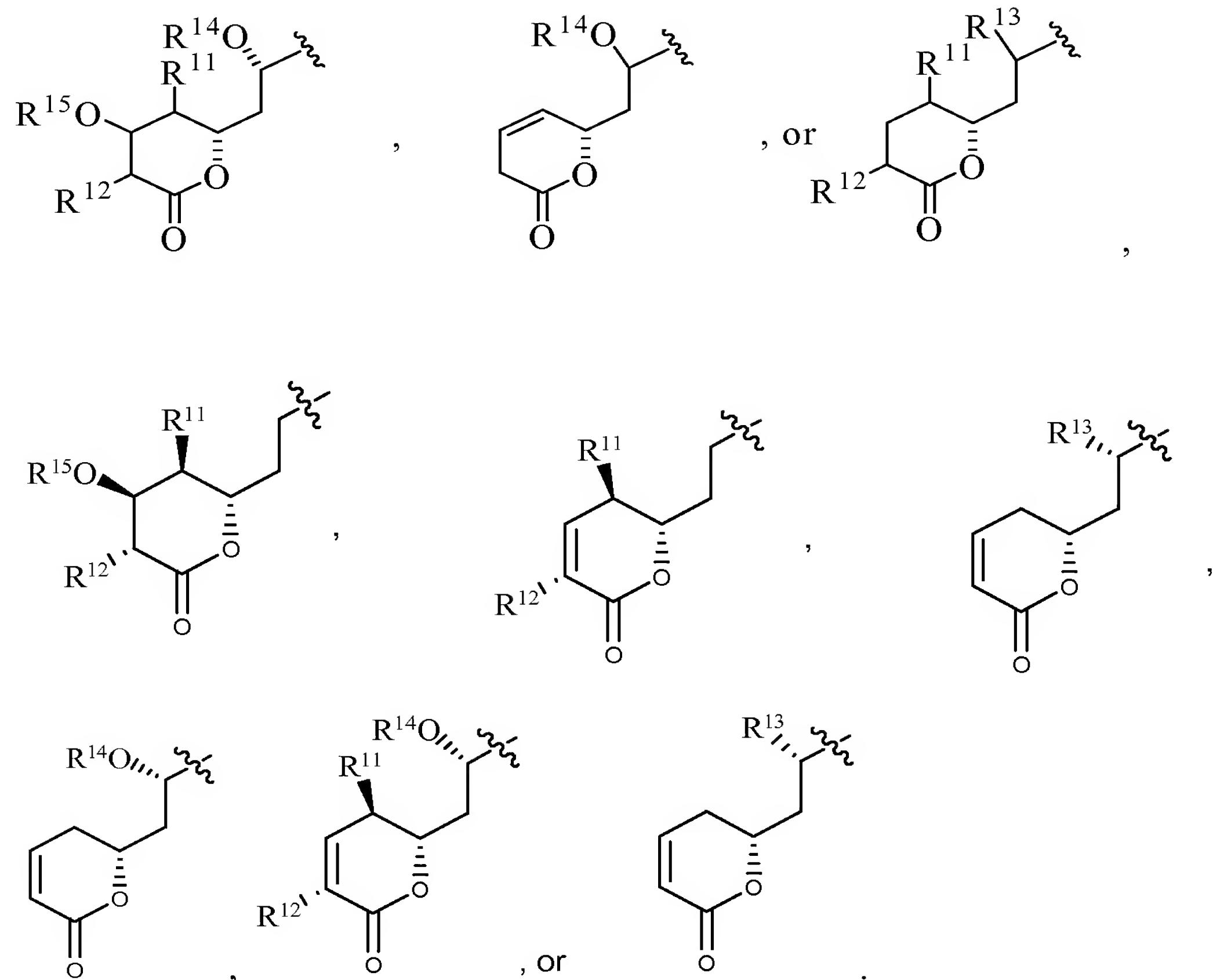
8. (original) The process of claim 5, wherein the metallating agent is a compound containing zinc.

9. (original) The process of claim 5, wherein the metallating agent is  $ZnCl_2$ .

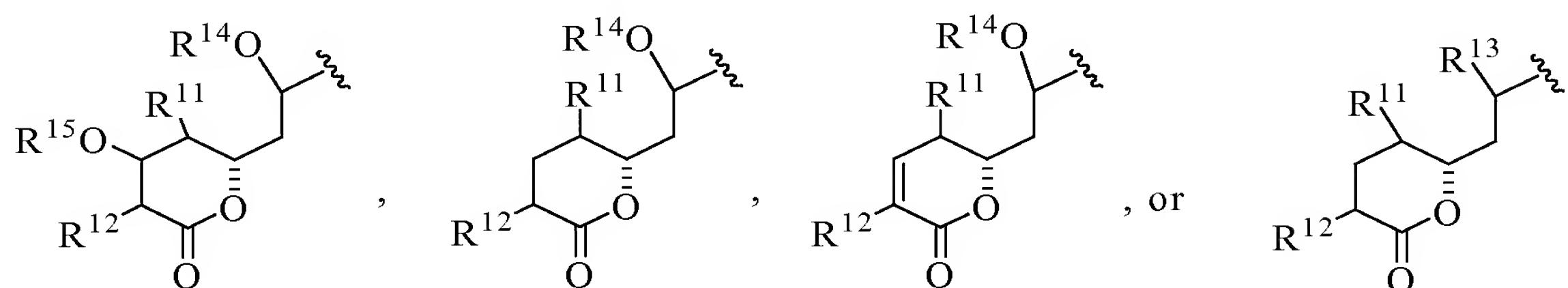
10. (original) The process of claim 1, wherein at least one of  $X^1$  and  $X^2$  are iodo.

11. (original) The process of claim 1, wherein R<sup>0</sup> is ethylenyl.
12. (original) The process of claim 1, wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are, independently, H or C<sub>1</sub>-C<sub>3</sub> alkyl.
13. (original) The process of claim 1, wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are CH<sub>3</sub>.
14. (original) The process of claim 1, wherein R<sup>4</sup> and R<sup>9</sup>, independently, are *tert*-butyldimethylsilyl, triethylsilyl, methoxymethyl, methylthiomethyl, 2-methoxyethoxymethyl, acetyl, benzyloxymethyl, 2-(trimethylsilyl)ethoxymethyl or allyl.
15. (original) The process of claim 1, wherein R<sup>4</sup> is *tert*-butyldimethylsilyl.
16. (original) The process of claim 1, wherein R<sup>9</sup> is methoxymethyl.
17. (original) The process of claim 1, wherein R<sup>10</sup> is CH<sub>3</sub>.
18. (original) The process of claim 1, wherein R<sup>11</sup>, R<sup>12</sup> and R<sup>13</sup> are CH<sub>3</sub>.
19. (original) The process of claim 1, wherein R<sup>14</sup> and R<sup>15</sup> are, independently, *tert*-butyldimethylsilyl, triethylsilyl, methoxymethyl, methylthiomethyl, 2-methoxyethoxymethyl, acetyl, benzyloxymethyl, 2-(trimethylsilyl)ethoxymethyl or allyl.
20. (original) The process of claim 1, wherein R<sup>14</sup> and R<sup>15</sup> are, independently, *tert*-butyldimethylsilyl or methoxymethyl.
21. (original) The process of claim 1, wherein R<sup>25</sup> is *para*-methoxybenzyl.
22. (original) The process of claim 1, wherein J is

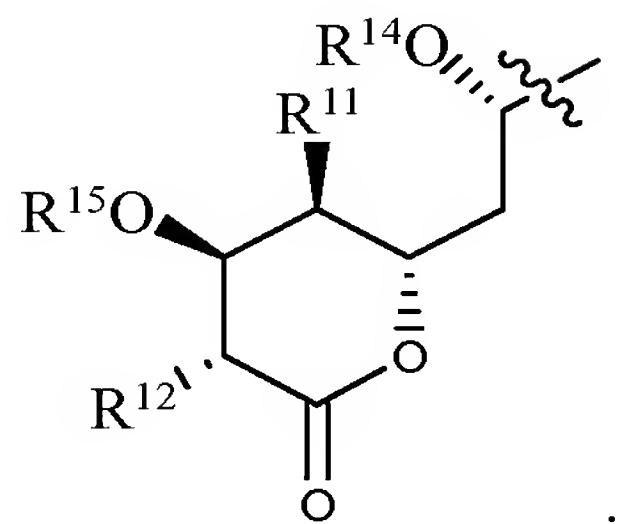




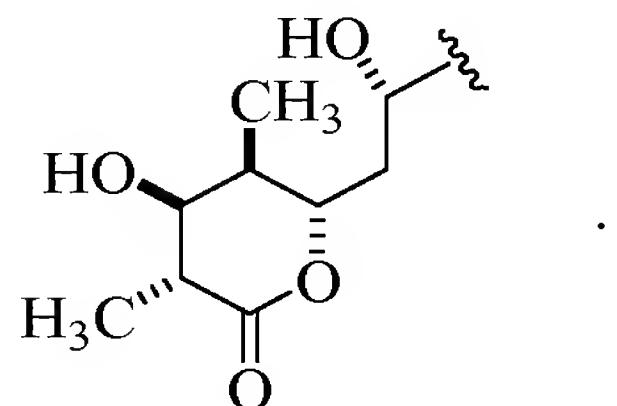
23. (original) The process of claim 1, wherein J is



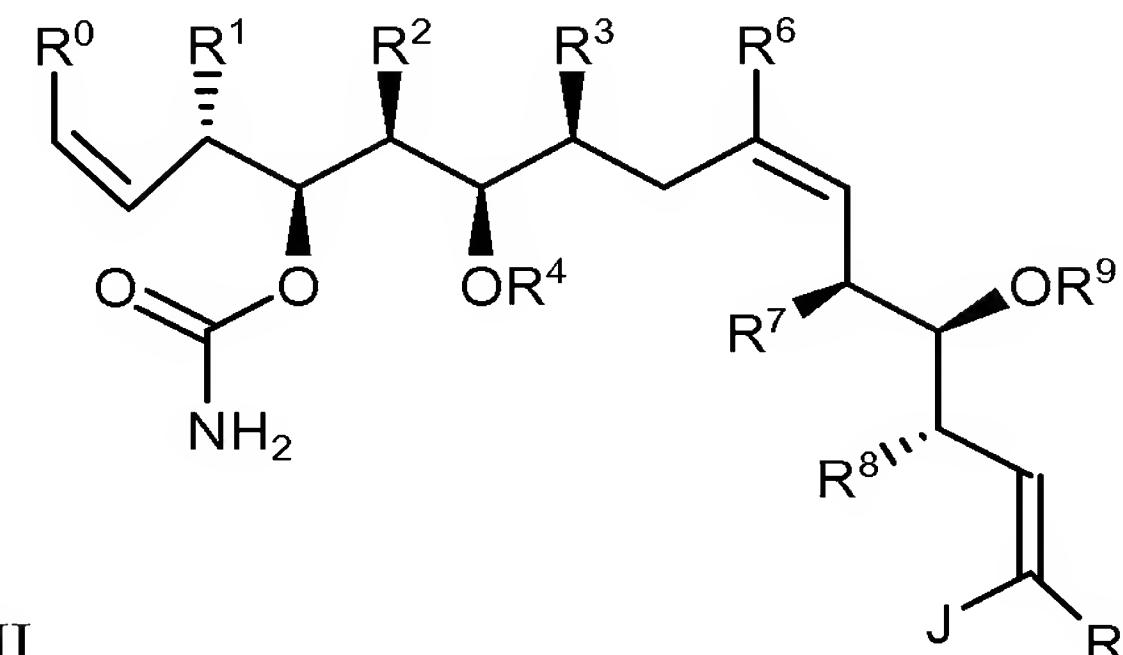
24. (original) The process of claim 1, wherein J is



25. (original) The process of claim 1, wherein J is



26. (original) The process of claim 1, further comprising a step of synthesizing a compound of formula II



II from compound I, which comprises

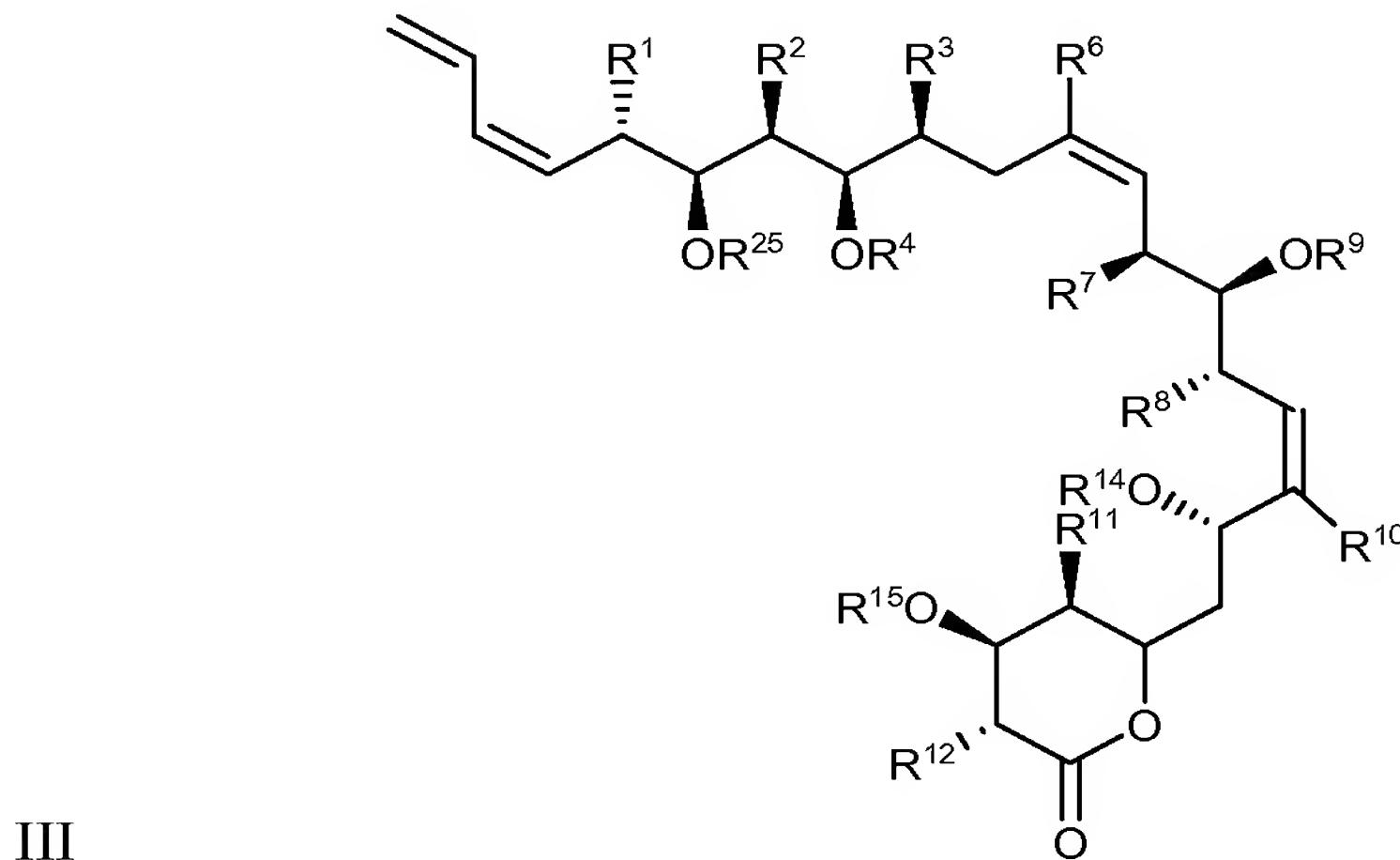
contacting the compound of formula I with an oxidizing agent to form a deprotected compound, and

contacting the deprotected compound with Cl<sub>3</sub>CCONCO in the presence of a hydrolyzing agent.

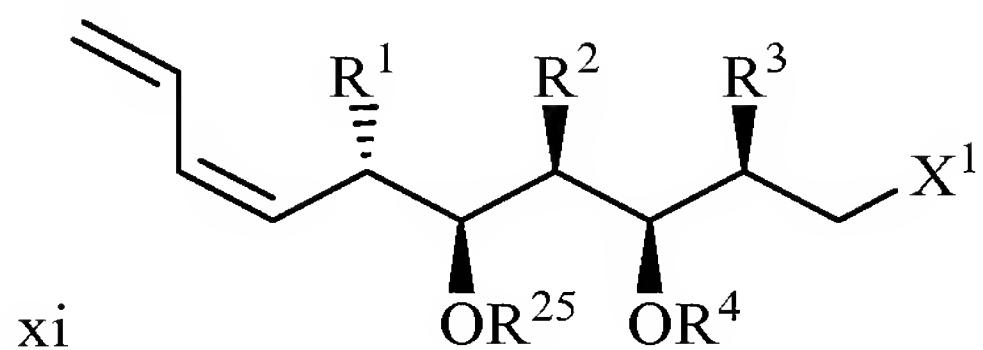
27. (original) The process of claim 26, wherein the oxidizing agent is 2,3-dichloro-5,6-dicyano-1,4-benzoquinone.

28. (original) The process of claim 26, wherein the hydrolyzing agent is Al<sub>2</sub>O<sub>3</sub>.

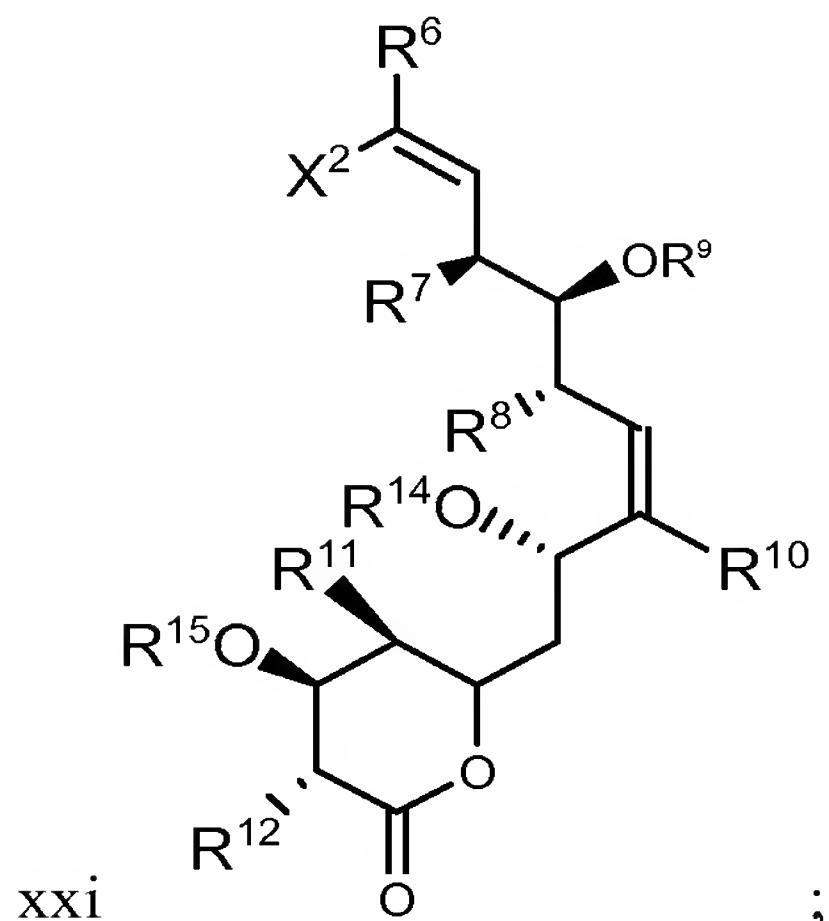
29. (original) A process for synthesizing a compound of formula III



comprising contacting a diene of formula xi



with a lactone of formula xxi



wherein  $R^1$ ,  $R^2$ ,  $R^3$ ,  $R^6$ ,  $R^7$ ,  $R^8$ ,  $R^{11}$ , and  $R^{12}$  are, independently, H or C<sub>1</sub>-C<sub>10</sub> alkyl;  $R^4$ ,  $R^9$ ,  $R^{14}$ , and  $R^{15}$  are, independently, an acid labile hydroxyl protecting group;

$R^{10}$  is hydrogen or C<sub>1</sub>-C<sub>6</sub> alkyl;

$R^{25}$  is hydrogen or an oxidation stable hydroxyl protecting group; and

$X^1$  and  $X^2$  are, independently, a halogen, triflate, tosylate, or mesylate.

30. (original) The process of claim 29, further comprising subjecting the process to the presence of a catalytically effective amount of a cross-coupling metal catalyst.

31. (original) The process of claim 29, wherein the cross-coupling metal catalyst comprises nickel or palladium.

32. (original) The process of claim 29, wherein the cross-coupling metal catalyst is Pd(0).

33. (original) The process of claim 29, further comprising contacting the compound of formula xi with a metallating agent, wherein the metallating agent is a compound containing boron, zinc, tin or magnesium or aluminum.

34. (original) The process of claim 33, wherein the metallating agent is a compound containing boron.

35. (original) The process of claim 33, wherein the metallating agent is MeO-9-BBN.

36. (Previously Presented) The process of claim 33, wherein the metallating agent is a compound containing zinc.

37. (original) The process of claim 33, wherein the metallating agent is ZnCl<sub>2</sub>.

38. (original) The process of claim 29, wherein at least one of  $X^1$  and  $X^2$  are iodine.

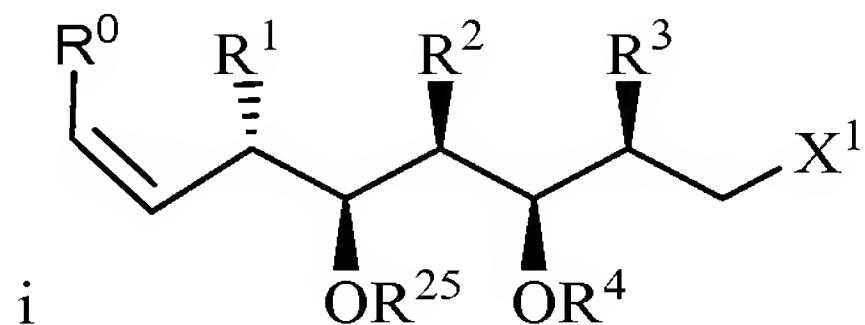
39. (original) The process of claim 29, wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>6</sup>, R<sup>7</sup>, R<sup>8</sup>, R<sup>11</sup>, and R<sup>12</sup> are methyl.

40. (original) The process of claim 29, wherein R<sup>4</sup>, R<sup>9</sup>, R<sup>14</sup>, and R<sup>15</sup> are, independently, *tert*-butyldimethylsilyl or methoxymethyl.

41. (original) The process of claim 29, wherein R<sup>10</sup> is hydrogen.

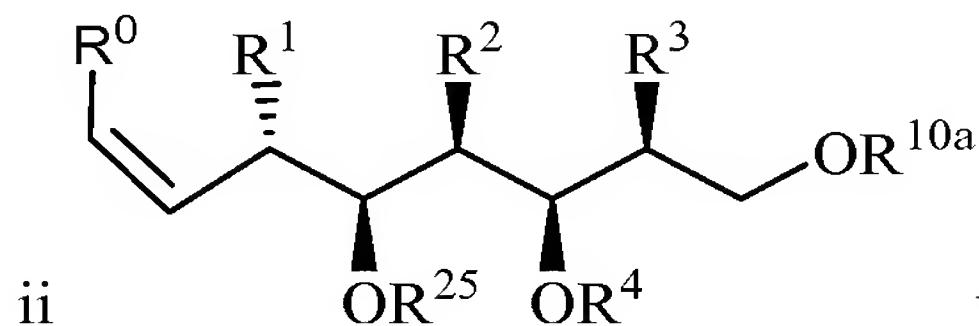
42. (original) The process of claim 29, wherein R<sup>25</sup> is *para*-methoxy benzyl.

43. (original) A process for synthesizing a halogenated alkylene of formula i



comprising:

contacting an alkenyl of formula ii



with a mild acid; and

adding to the process (X<sup>1</sup>)<sub>2</sub> in the presence of P(R<sup>18</sup>)<sub>3</sub>; wherein:

R<sup>0</sup> is C<sub>1-6</sub> alkyl, C<sub>2-6</sub> alkenyl, C<sub>2-6</sub> alkynyl, (CH<sub>2</sub>)<sub>r</sub>(C<sub>3-6</sub> cycloalkyl), (CH<sub>2</sub>)<sub>r</sub>(aryl)

or (CH<sub>2</sub>)<sub>r</sub>(heterocycle), wherein r is 0, 1, 2, 3, or 4;

R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are, independently, H or C<sub>1-C<sub>10</sub></sub> alkyl;

R<sup>4</sup> is H or an acid labile hydroxyl protecting group;

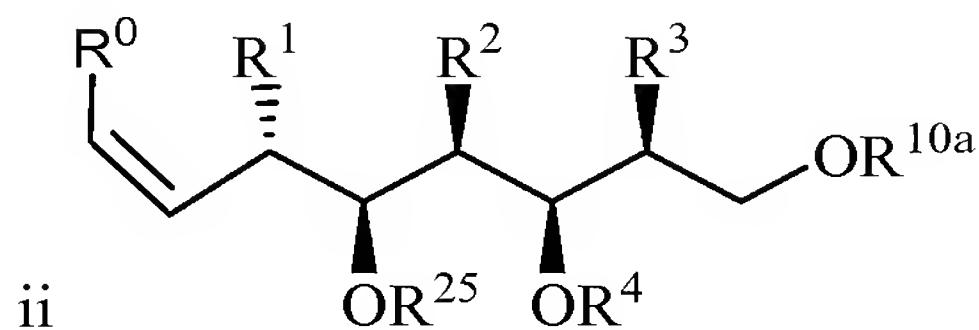
R<sup>10a</sup> is a hydroxyl protecting group;

R<sup>18</sup> is C<sub>6-C<sub>14</sub></sub> aryl;

R<sup>25</sup> is hydrogen or an oxidatively labile hydroxyl protecting group; and

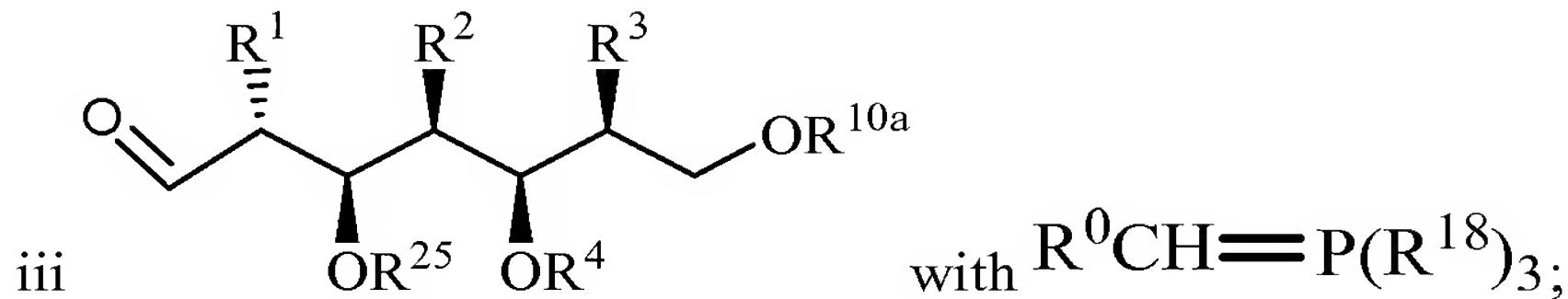
$X^1$  is a halogen, triflate, tosylate, or mesylate.

44. (original) The process of claim 43 wherein  $R^0$  is ethylene.
45. (original) The process of claim 43 wherein  $R^1$ ,  $R^2$  and  $R^3$  are each methyl.
46. (original) The process of claim 43 wherein  $R^4$  is *para*-methoxybenzyl.
47. (original) The process of claim 43 wherein  $R^{18}$  is phenyl.
48. (original) The process of claim 43 wherein  $R^{25}$  is *tert*-butyldimethylsilyl.
49. (original) The process of claim 43 wherein  $X^1$  is iodo.
50. (original) The process of claim 43, wherein  $R^{10a}$  is trityl.
51. (original) A process of synthesizing a compound of formula ii



comprising:

contacting an aldehyde of formula iii



wherein

$R^0$  is C<sub>1-6</sub> alkyl, C<sub>2-6</sub> alkenyl, C<sub>2-6</sub> alkynyl, (CH<sub>2</sub>)<sub>r</sub>(C<sub>3-6</sub> cycloalkyl), (CH<sub>2</sub>)<sub>r</sub>(aryl)

or (CH<sub>2</sub>)<sub>r</sub>(heterocycle), wherein r is 0, 1, 2, 3, or 4;

$R^1$ ,  $R^2$ , and  $R^3$  are, independently, H or C<sub>1-C<sub>10</sub></sub> alkyl;

$R^4$  is H or an acid labile hydroxyl protecting group;

$R^{10a}$  is a hydroxyl protecting group;

$R^{18}$  is  $R^{18}$  is  $C_6$ - $C_{14}$  aryl; and

$R^{25}$  is hydrogen or an oxidatively labile hydroxyl protecting group.

52. (original) The process of claim 51 wherein  $R^0$  is ethylene.

53. (original) The process of claim 51 wherein  $R^1$ ,  $R^2$  and  $R^3$  are each methyl.

54. (original) The process of claim 51 wherein  $R^4$  is *para*-methoxybenzyl.

55. (original) The process of claim 51 wherein  $R^{18}$  is phenyl.

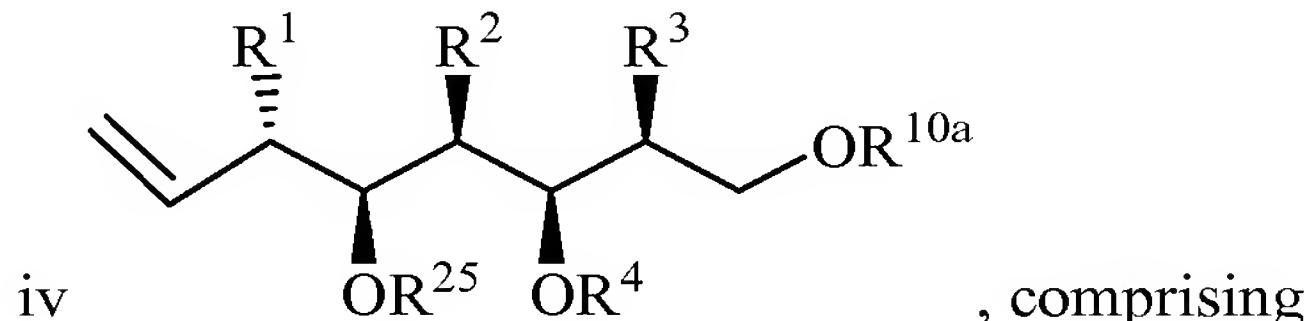
56. (original) The process of claim 51 wherein  $R^{25}$  is *tert*-butyldimethylsilyl.

57. (original) The process of claim 51, wherein  $R^{10a}$  is trityl.

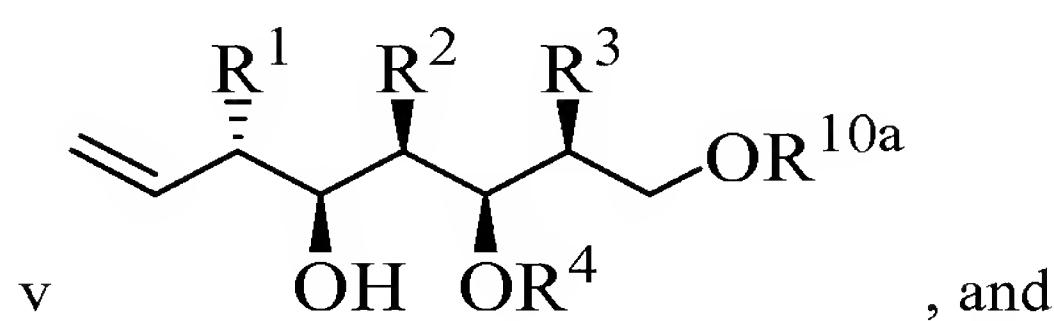
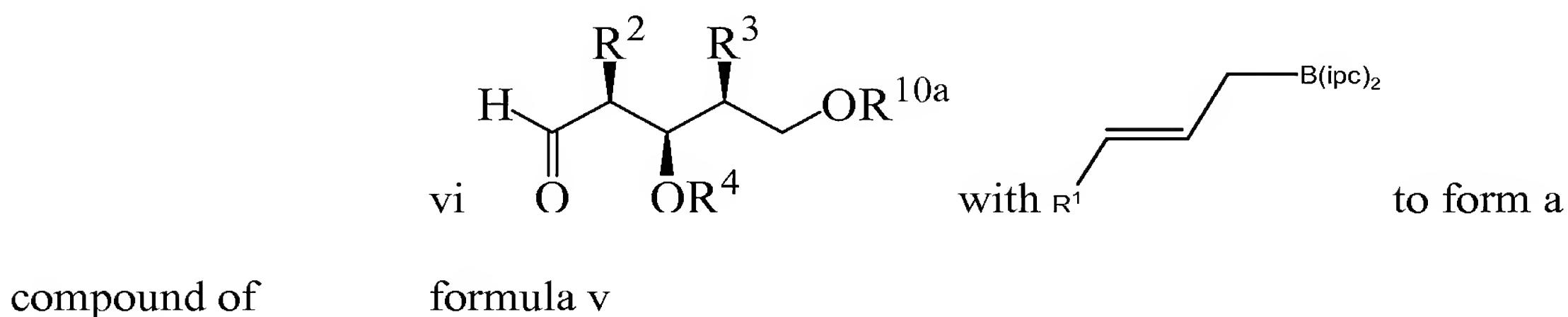
58. (original) The process of claim 52, wherein the compound of formula iii is

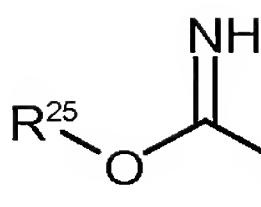
contacted with allyldiphenylphosphine instead of  $R^0CH=P(R^{18})_3$ .

59. (original) A process of synthesizing a compound of formula iv



contacting a compound of formula vi



reacting a compound of formula v with ; wherein

R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are, independently, H or C<sub>1</sub>-C<sub>10</sub> alkyl;

R<sup>4</sup> is H or an acid labile hydroxyl protecting group;

R<sup>10a</sup> is a hydroxyl protecting group; and

R<sup>25</sup> is hydrogen or an oxidatively labile hydroxyl protecting group.

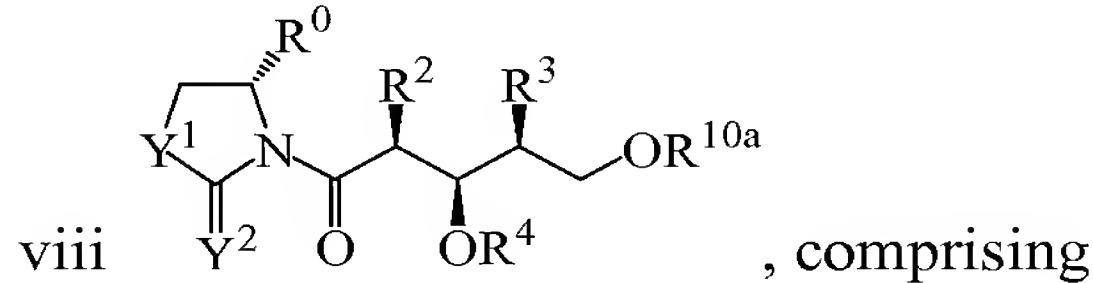
60. (original) The process of claim 59 wherein R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> are each methyl.

61. (original) The process of claim 59 wherein R<sup>4</sup> is *para*-methoxybenzyl.

62. (original) The process of claim 59 wherein R<sup>25</sup> is *tert*-butyldimethylsilyl.

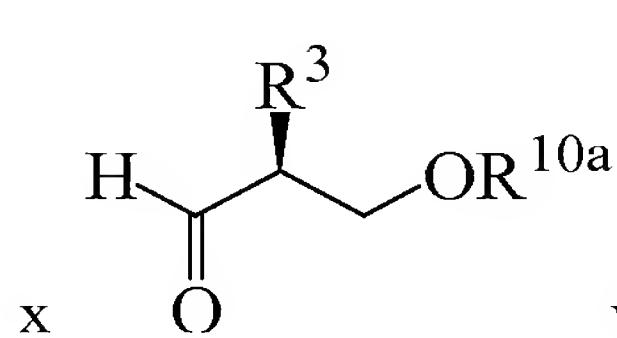
63. (original) The process of claim 59, wherein R<sup>10a</sup> is trityl.

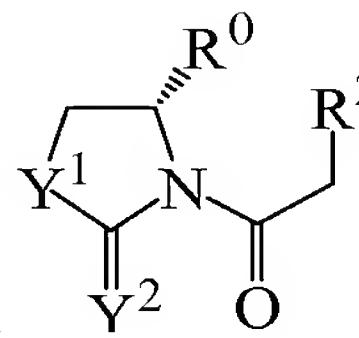
64. (original) A process of forming a compound of formula viii

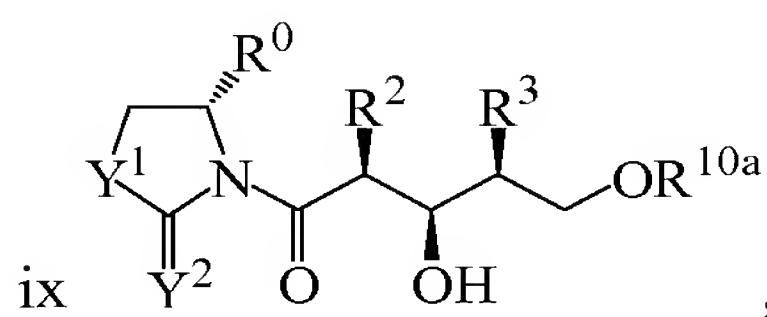


, comprising

contacting a compound of formula x

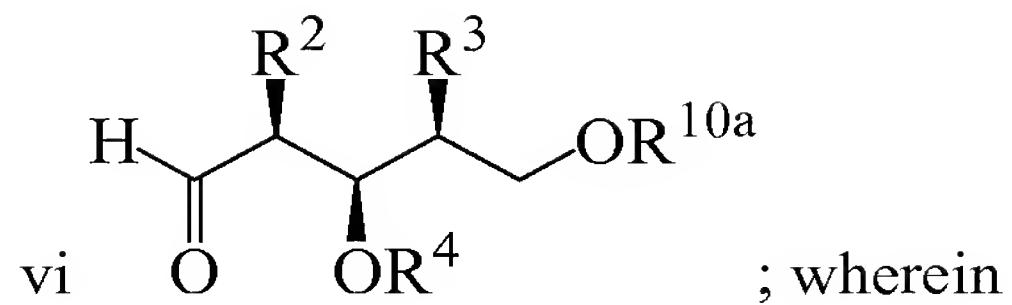


with  to form a compound of



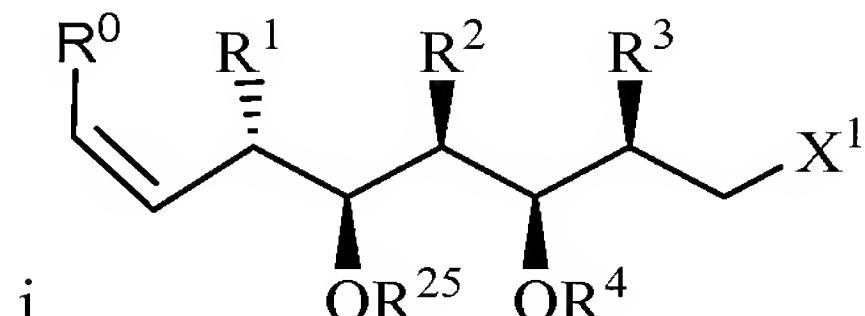
formula

converting the compound of formula ix to a compound of formula vi

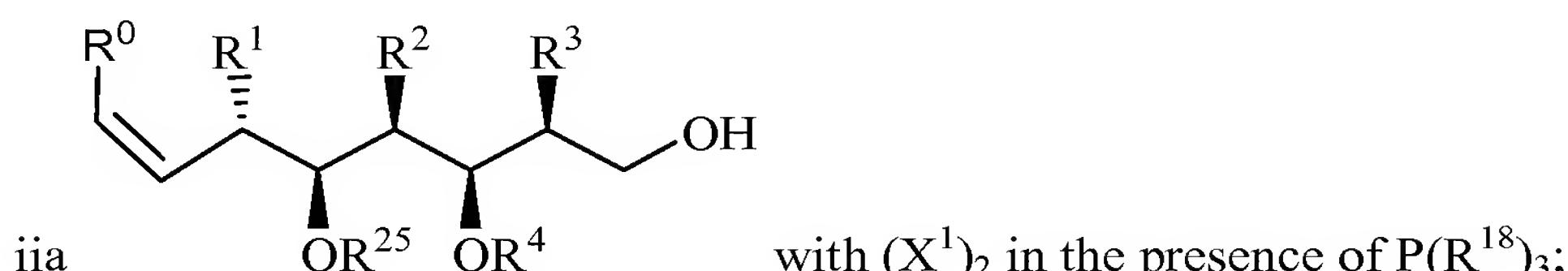


$R^0$  is  $C_{1-6}$  alkyl,  $C_{2-6}$  alkenyl,  $C_{2-6}$  alkynyl,  $(CH_2)_r(C_{3-6}$  cycloalkyl),  $(CH_2)_r(\text{aryl})$  or  $(CH_2)_r(\text{heterocycle})$ , wherein  $r$  is 0, 1, 2, 3, or 4;  
 $R^2$  and  $R^3$  are, independently, H or  $C_1-C_{10}$  alkyl;  
 $R^4$  is H or an acid labile hydroxyl protecting group;  
 $R^{10a}$  is a hydroxyl protecting group; and  
 $Y^1$  and  $Y^2$  are, independently, O or S.

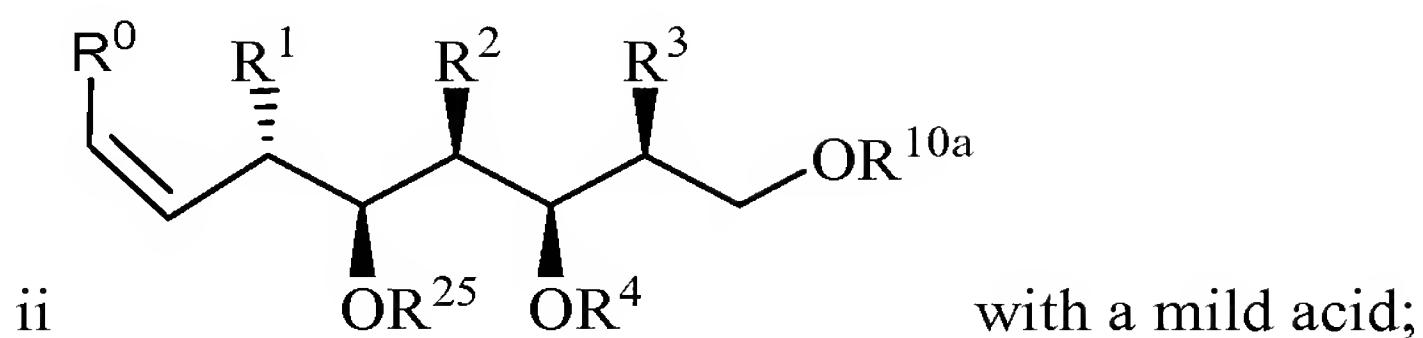
65. (original) The process of claim 64 wherein  $R^0$  is benzyl.
66. (original) The process of claim 64 wherein  $R^2$  and  $R^3$  are each methyl.
67. (original) The process of claim 64 wherein  $R^4$  is *para*-methoxybenzyl.
68. (original) The process of claim 64 wherein  $R^{10a}$  is trityl.
69. (original) A process for synthesizing a halogenated alkylene of formula i



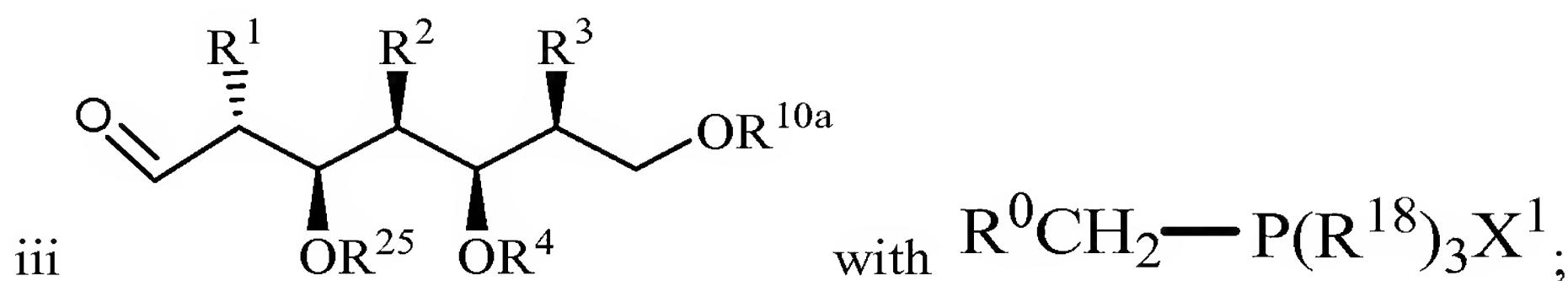
comprising,  
contacting an alcohol of formula iiia



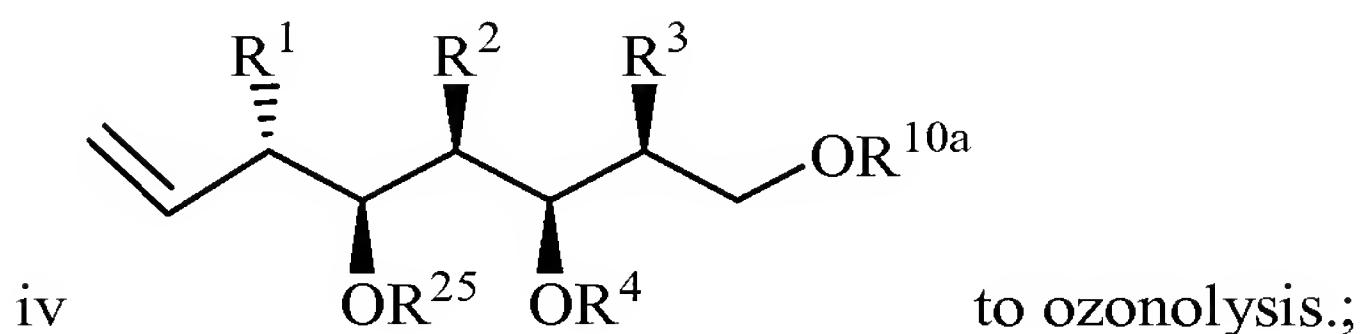
yielding the compound of formula iiia by contacting an alkylene of formula ii



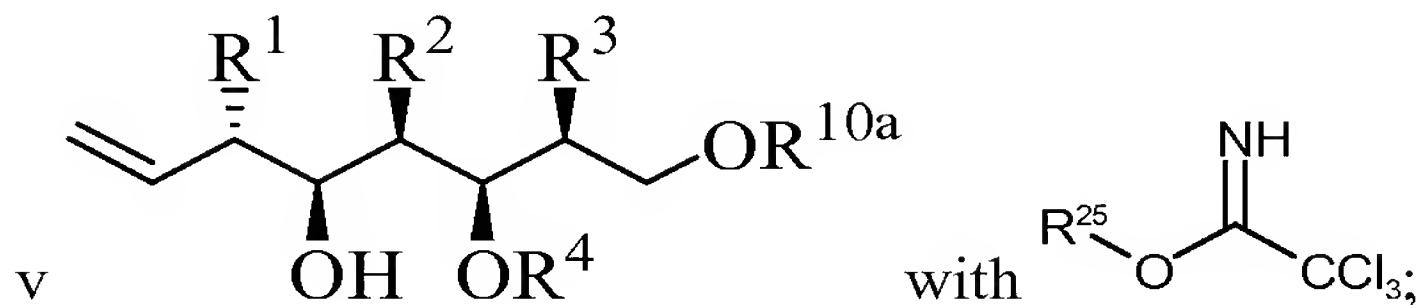
forming the compound of formula ii by contacting an aldehyde of formula iii



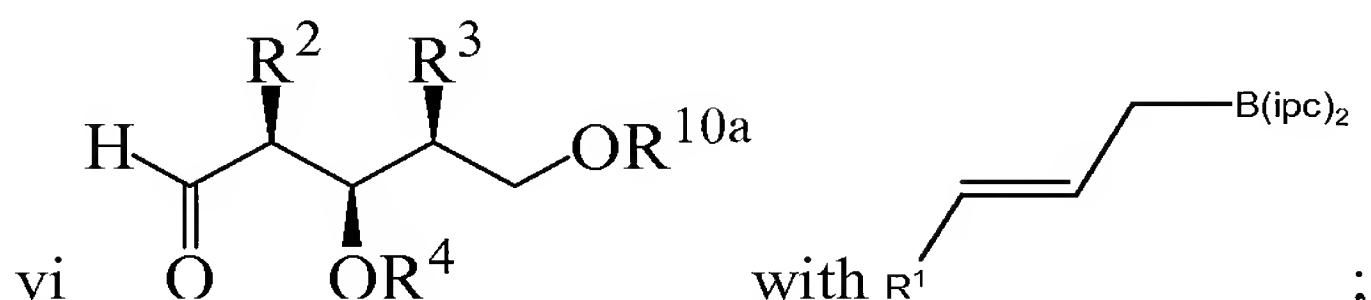
producing the compound of formula iii by subjecting a compound of formula iv



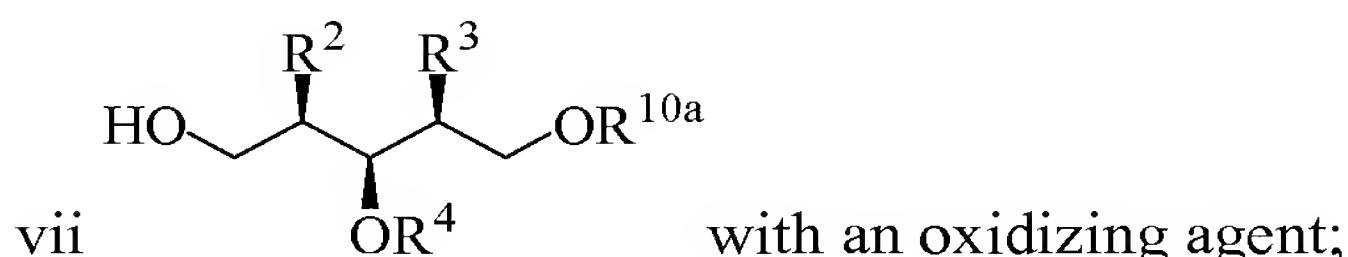
resulting in the compound of formula iv by contacting a compound of formula v



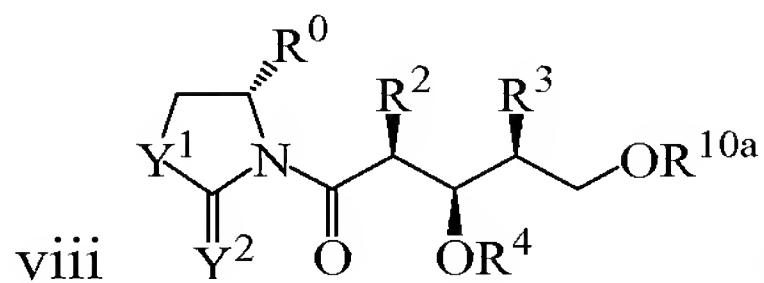
synthesizing the compound of formula v by contacting a compound of formula vi



producing the compound of formula vi by contacting a compound of formula vii

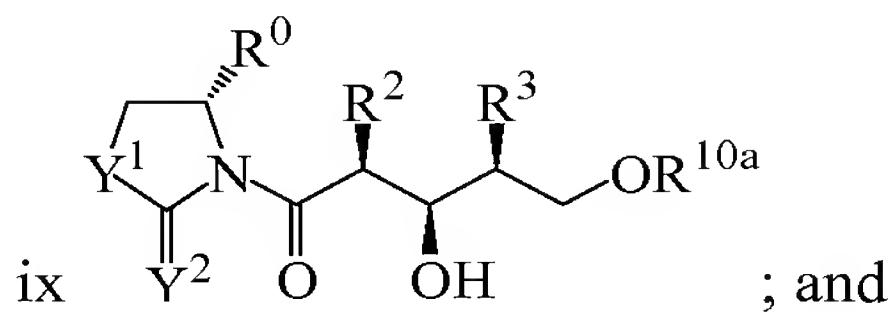


forming the compound of formula vii by contacting a compound of formula viii



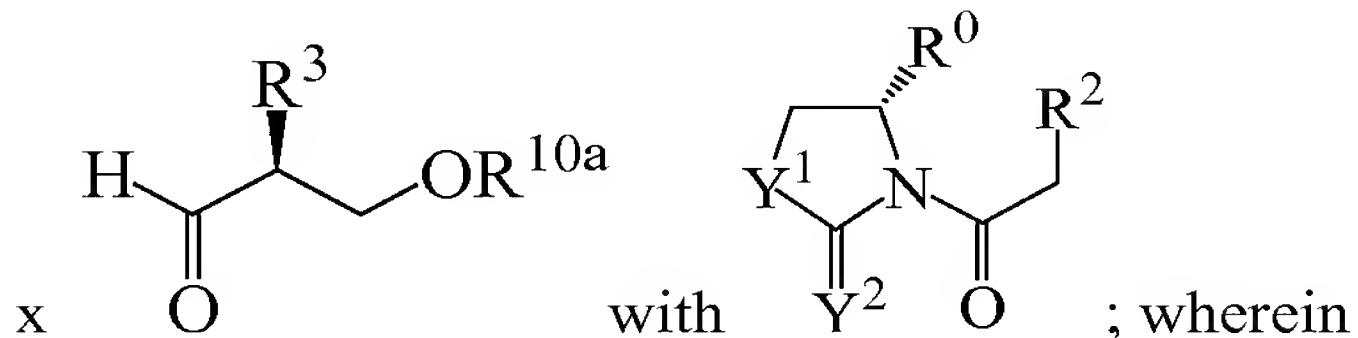
with a reducing agent;

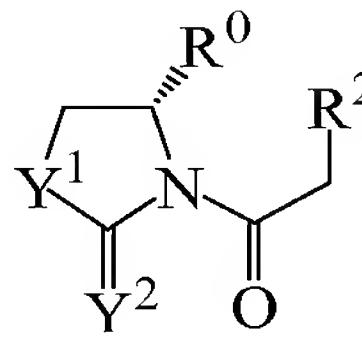
synthesizing the compounds of formula viii and by protecting a hydroxyl moiety of a compound of formula ix



; and

yielding the compounds of formula ix and ix' by contacting a compound of formula x



with      

; wherein

R<sup>0</sup> is C<sub>1-6</sub> alkyl, C<sub>2-6</sub> alkenyl, C<sub>2-6</sub> alkynyl, (CH<sub>2</sub>)<sub>r</sub>(C<sub>3-6</sub> cycloalkyl), (CH<sub>2</sub>)<sub>r</sub>(aryl)

or (CH<sub>2</sub>)<sub>r</sub>(heterocycle), wherein r is 0, 1, 2, 3, or 4;

R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are, independently, H or C<sub>1-C10</sub> alkyl;

R<sup>4</sup> is H or an acid labile hydroxyl protecting group;

R<sup>10a</sup> is a hydroxyl protecting group;

R<sup>18</sup> is C<sub>6-C14</sub> aryl;

R<sup>25</sup> is hydrogen or an oxidatively labile hydroxyl protecting group;

X<sup>1</sup> is a halogen, triflate, tosylate, or mesylate; and

Y<sup>1</sup> and Y<sup>2</sup> are, independently, S or O.

70. (original) The process of claim 69 wherein R<sup>0</sup> is benzyl.

71. (original) The process of claim 69 wherein R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> are each methyl.

72. (original) The process of claim 69 wherein R<sup>4</sup> is *para*-methoxybenzyl.

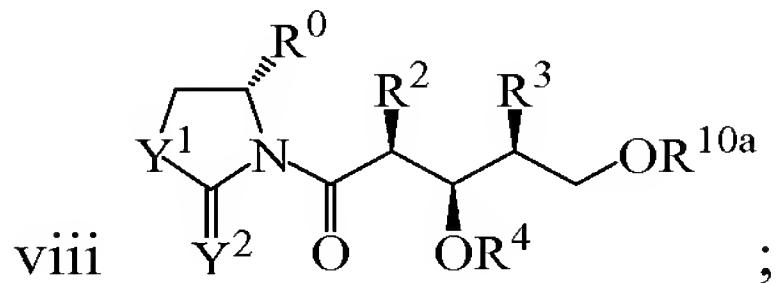
73. (original) The process of claim 69 wherein R<sup>18</sup> is phenyl.

74. (original) The process of claim 69 wherein R<sup>25</sup> is *tert*-butyldimethylsilyl.

75. (original) The process of claim 69 wherein X<sup>1</sup> is iodo.

76. (original) The process of claim 69, wherein R<sup>10a</sup> is trityl.

77. (original) A compound of formula viii



wherein

R<sup>0</sup> is C<sub>1-6</sub> alkyl, C<sub>2-6</sub> alkenyl, C<sub>2-6</sub> alkynyl, (CH<sub>2</sub>)<sub>r</sub>(C<sub>3-6</sub> cycloalkyl), (CH<sub>2</sub>)<sub>r</sub>(aryl)

or (CH<sub>2</sub>)<sub>r</sub>(heterocycle), wherein r is 0, 1, 2, 3, or 4;

R<sup>2</sup> and R<sup>3</sup> are, independently, H or C<sub>1-C<sub>10</sub></sub> alkyl;

R<sup>4</sup> is H or an acid labile hydroxyl protecting group;

R<sup>10a</sup> is a hydroxyl protecting group; and

Y<sup>1</sup> and Y<sup>2</sup> are, independently, S or O.

78. (original) The compound of claim 77 wherein R<sup>0</sup> is benzyl.

79. (original) The compound of claim 77 wherein R<sup>2</sup> and R<sup>3</sup> are each methyl.

80. (original) The compound of claim 77 wherein R<sup>4</sup> is *para*-methoxybenzyl.

81. (original) The compound of claim 77 wherein R<sup>10a</sup> is trityl.

82. (original) The compound of claim 77 wherein at least one of Y<sup>1</sup> and Y<sup>2</sup> is S.

83. (original) The compound of claim 77 wherein at least one of Y<sup>1</sup> and Y<sup>2</sup> is O.